Student Edition

California Education and the Environment Initiative

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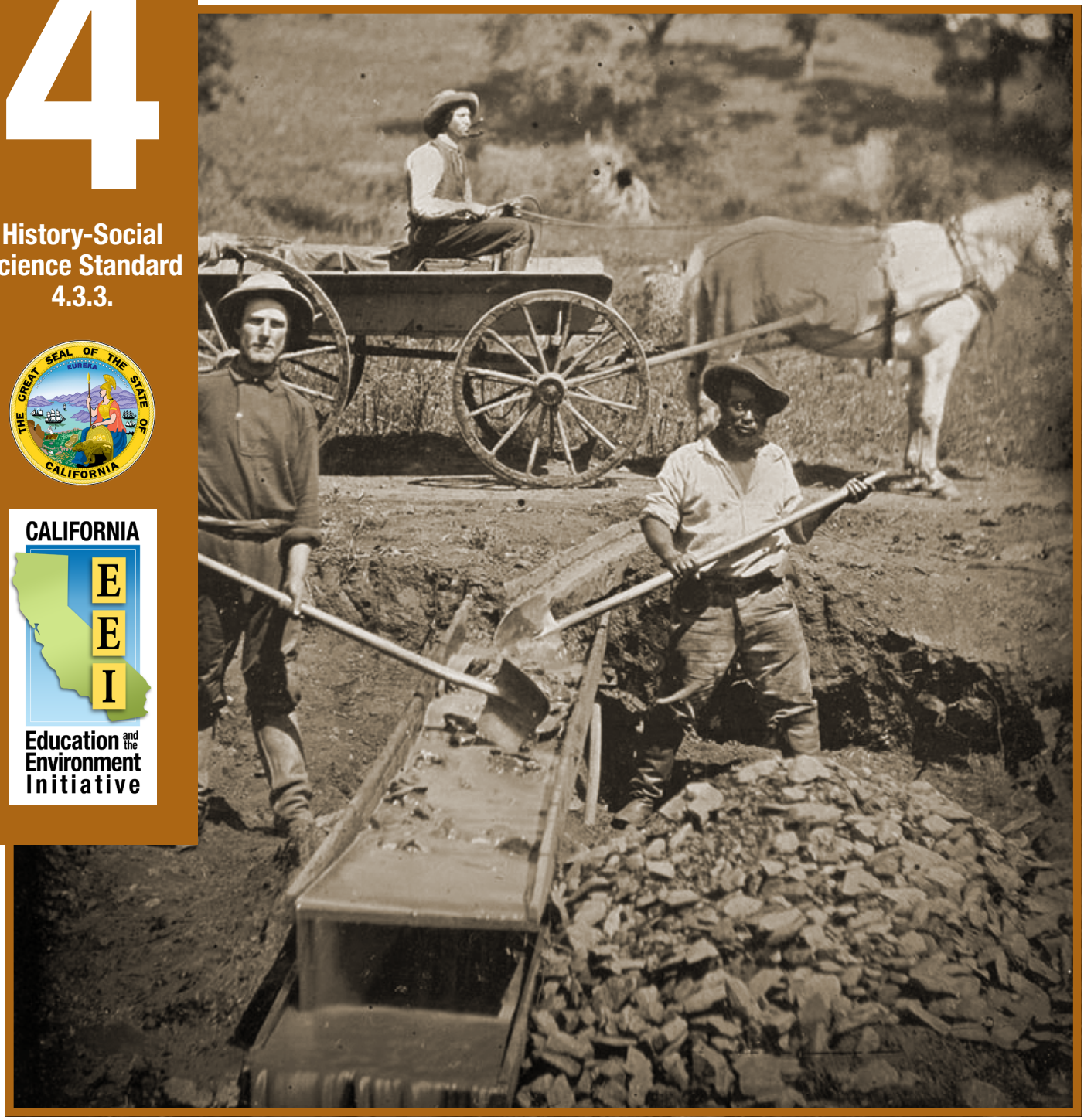
History-Social Science Standard 4.3.3.



Witnessing the Gold Rush

California Education and the Environment Initiative
Approved by the California State Board of Education, 2010

The Education and the Environment Curriculum is a cooperative endeavor of the following entities:
California Environmental Protection Agency
California Natural Resources Agency
Office of the Secretary of Education
California State Board of Education
California Department of Education
California Integrated Waste Management Board

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Andrea Lewis, Assistant Secretary for Education and Quality Programs, California Environmental Protection Agency
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Key Partners:
Special thanks to **Heal the Bay,** sponsor of the EEI law, for their partnership and participation in reviewing portions of the EEI curriculum.

Valuable assistance with maps, photos, videos and design was provided by the **National Geographic Society** under a contract with the State of California.

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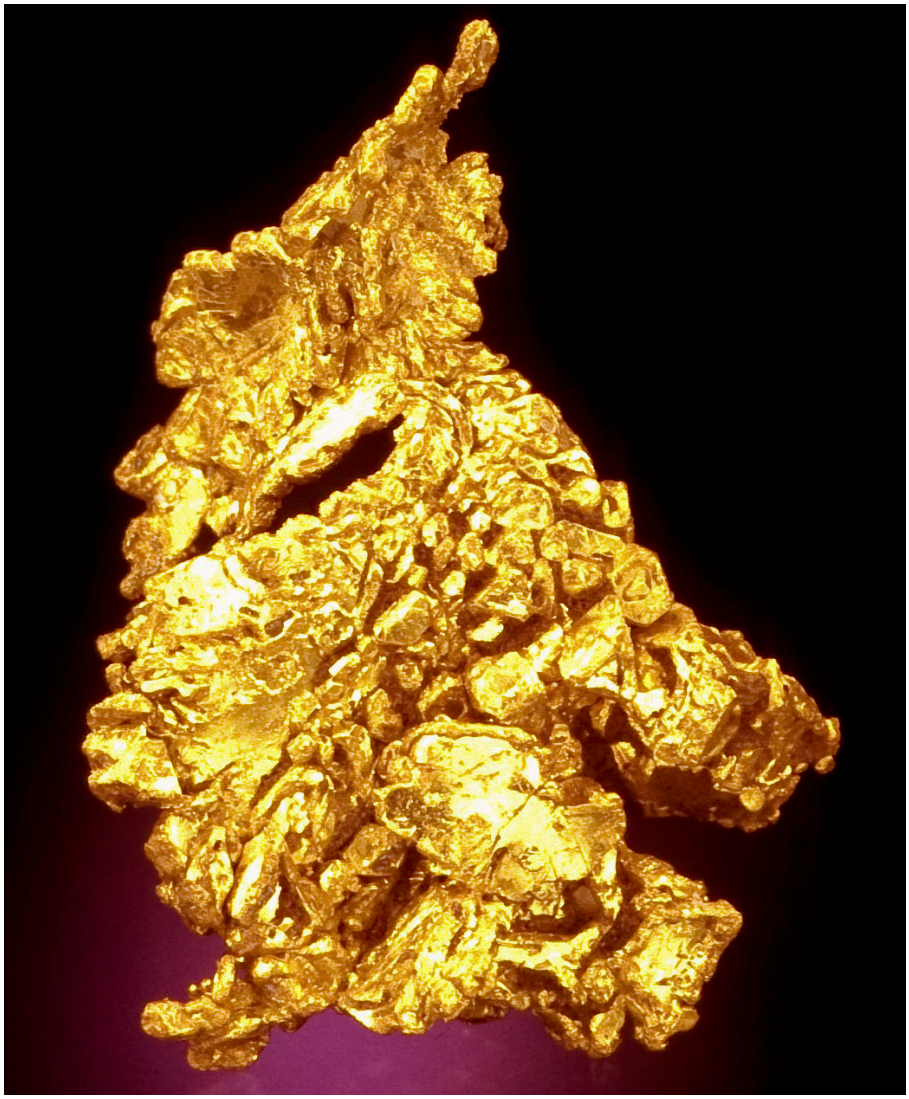
The Journey of a Nugget

A bald eagle looks down on the mountains below. Pine trees grow in every direction. She is young and out on her first flight alone, without her parents. She is hungry. The young eagle dives into a valley and flies along with the river below. Her eyes look carefully for fish flashing in the water.

It is January 1848 in the Sierra Nevada Mountains. The eagle flies toward the new sawmill just built along the stream. As she nears the place where the river meets the mill, she sees something shiny just below the surface of the water. Is it a salmon or a steelhead trout? She dives toward the river and stretches one talon down into the icy water. Instead of a nice fat fish, what does she grab? A gold nugget!

The eagle lets the gold nugget fall. It hits the roof of the mill below with a loud thud. Gold is not what she wants to eat. She decides to fly to the clear pools in the river above the sawmill. Maybe there are fish there.



Gold nugget

Where Did the Gold Come From?

Millions of years ago, the mountains in California were only small hills. But the land was changing. Hot, melted rock called magma pushed its way out of the ground through large cracks in the Earth. Some of the magma poured out very quickly, creating volcanoes. Some of the magma never made it out of the Earth.

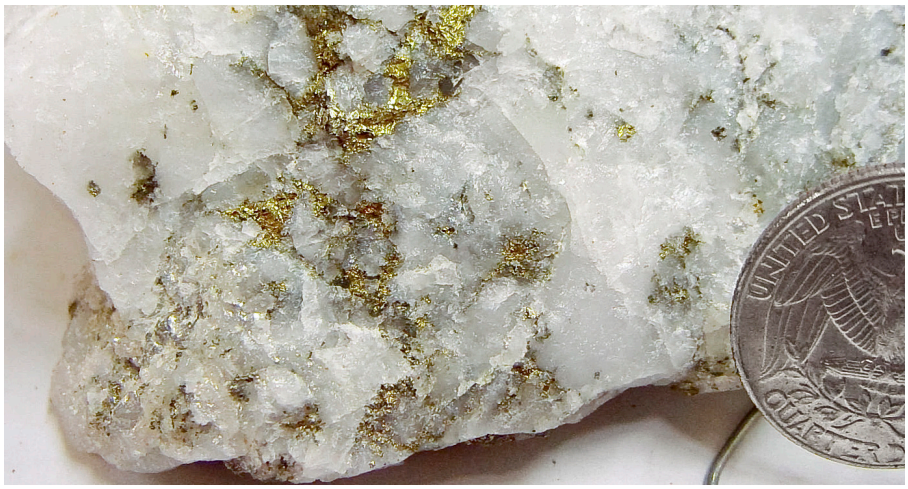
Two to five miles underground, magma moved along in rivers of melted rock. This magma slowly cooled and became a rock called granite. Long streaks of two shiny minerals—silver and gold—formed in the granite rock. These streaks are called veins. The granite, along with the veins of silver and gold, were pushed up by magma flowing even deeper underground. Granite rock formed the mountains and valleys of the Sierra Nevada range over millions of years.

Building Up and Breaking Down…

Mountains build up, and they also wear down. Their large rocks, called boulders, break into smaller rocks. Small rocks break down, too, and become sand, silt, and mud. This happens because of erosion. Water, ice, and wind erode rocks. The running water in a river erodes the land over which it flows. As it moves, the river water picks up small rocks and sand from the land and carries them downriver.

The rocks in the river water bounce and smash against other rocks, breaking them apart as the river moves along. As rivers flowed through the Sierra Nevada over thousands of years, their waters broke up the granite rocks that were part of the mountains and valleys. These rocks ended up in the rivers, in the riverbeds, or along the banks of the rivers. Pieces of gold and silver—called nuggets—entered the rivers, too, as the veins in the granite were broken up.

Gold is very heavy. So is silver, but it is not



Vein of gold in rock

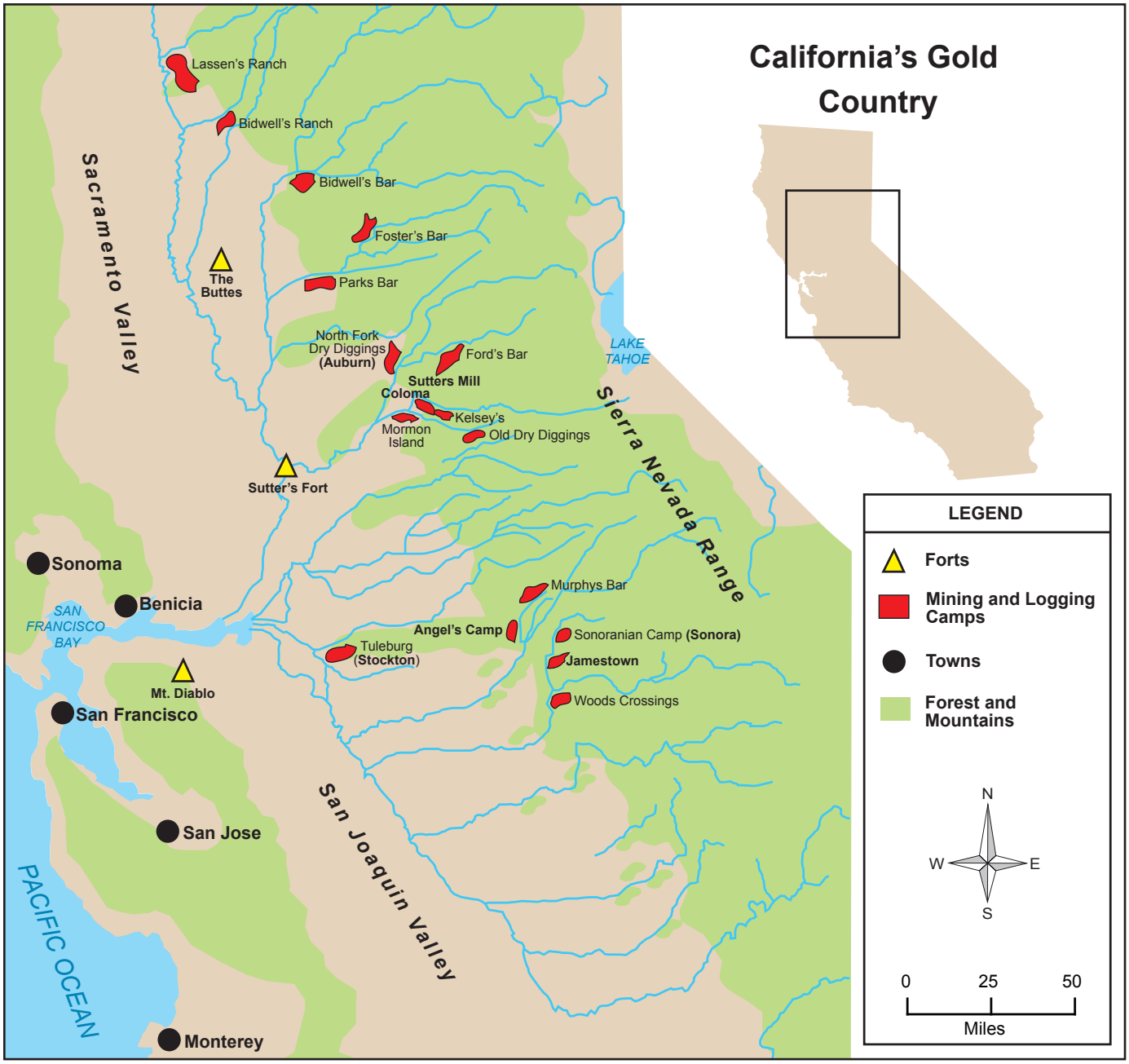
High Sierra stream

as heavy as gold. As the veins of gold and silver broke into pieces, the nuggets were many different sizes. Large nuggets of gold were too heavy for the river water to carry, and they sank down to the riverbed, not far from the vein. Smaller nuggets of gold could be carried far away by the river currents.

The young eagle grabbed a medium-sized nugget from the river that day in 1848. The vein of gold from which it came was probably in the granite rock nearby.

What Happened to the Nugget the Eagle Dropped?

After dropping the nugget, the eagle notices a man working at the sawmill below. The man's name is James Marshall. He is checking the big wooden channel that runs from the stream to the waterwheel next to the sawmill. The water in the channel turns the waterwheel, which gives power to the mill. Mr. Marshall wants to make sure that the wooden channel is free from dirt, silt, and rocks, so the water will flow fast and turn the waterwheel. He moves some sand in the channel with a small shovel. Suddenly, he notices something shiny in the channel. He reaches his hands into the icy water. What does he find? A gold nugget! Mr. Marshall stares at the nugget and knows he has found something special. He does not even notice the young eagle as she swoops over the mill to search for fish upstream.


California's Gold Country
Lassen's Ranch
Bidwell's Ranch
Bidwell's Bar
Foster's Bar
The Buttes
Parks Bar
North Fork Dry Diggings (Auburn)
Ford's Bar
Sutters Mill
Coloma
Kelsey's
Mormon Island
Old Dry Diggings
Sutter's Fort
Sacramento Valley
Sierra Nevada Range
LAKE TAHOE
Sonoma
Benicia
SAN FRANCISCO BAY
Mt. Diablo
San Francisco
San Jose
Monterey
PACIFIC OCEAN
San Joaquin Valley
Murphys Bar
Angel's Camp
Tuleburg (Stockton)
Sonoranian Camp (Sonora)
Jamestown
Woods Crossings
LEGEND
Forts
Mining and Logging Camps
Towns
Forest and Mountains
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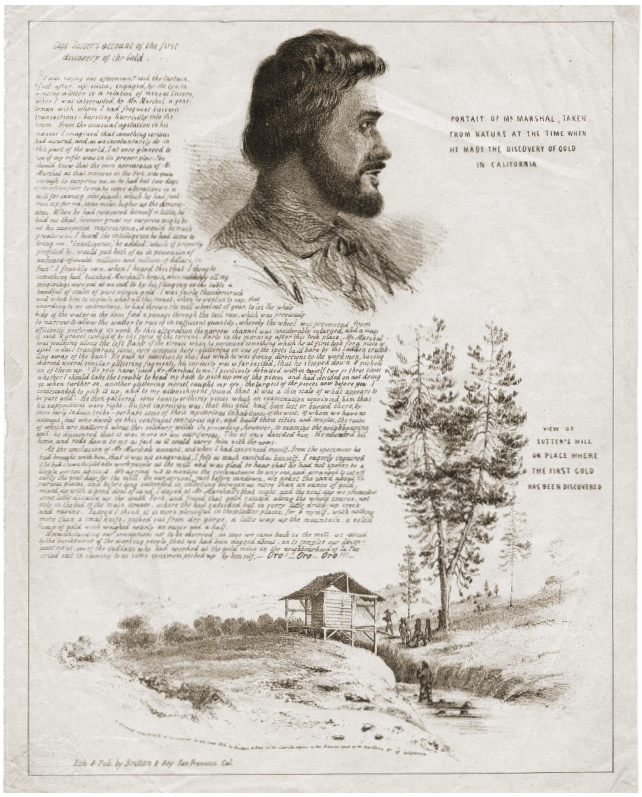
25
50
Miles

Sutter's Account of Gold Discovery

Excerpt 1

"It was a rainy afternoon when Mr. Marshall arrived at my office in the Fort, very wet. I was somewhat surprised to see him, as he was down a few days previous; and then, I sent up to Coloma a number of teams with provisions, mill irons, etc., etc. He told me then that he had some important and interesting news which he wished to communicate secretly to me... I went with him to my private rooms; he requested me to lock the door; I complied, but I told him at the same time that nobody was in the house except the clerk... I forgot to lock the doors, and it happened that the door was opened by the clerk just at the moment when Marshall took a rag from his pocket, showing me the yellow metal: he had about two ounces of it; but how quick Mr. M. put the yellow metal in his pocket again can hardly be described. The clerk came to see me on business, and excused himself for interrupting me, and as soon as he had left I was told, 'Now lock the doors; didn't I tell you that we might have listeners?' I told him that he need fear nothing about that, as it was not the habit of this gentleman; but I could hardly convince him that he need not be suspicious. Then Mr. M. began to show me this metal, which consisted of small pieces and specimens, some of them worth a few dollars; he told me that he had expressed his opinion to the laborers at the mill, that this might be gold; but some of them were laughing at him and called him a crazy man, and could not believe such a thing."



James Marshall and Sutter's Mill

Excerpt 2

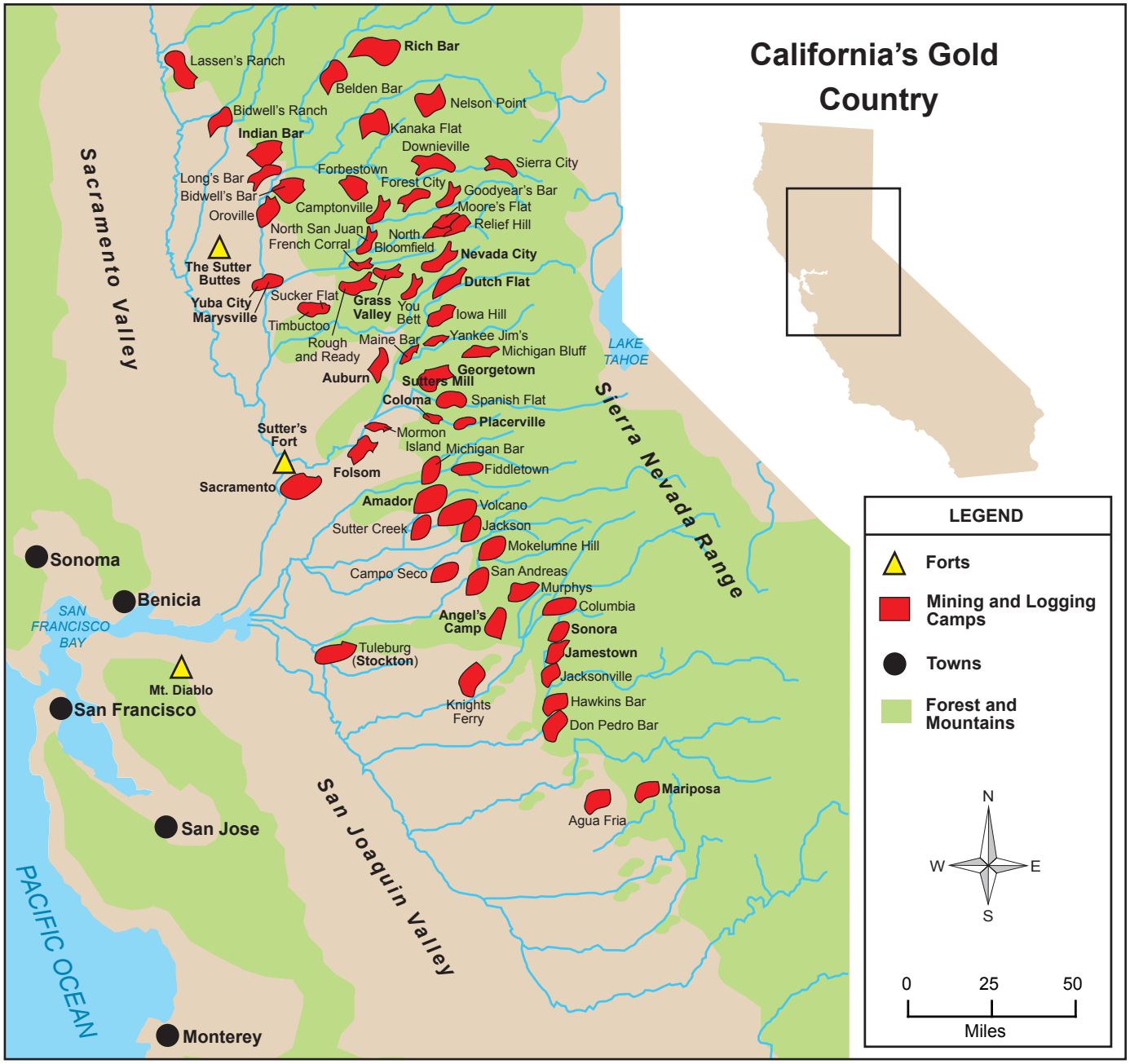
"Before my departure I had a conversation with all hands: I told them that I would consider it as a great favor if they would keep this discovery secret only for six weeks, so that I could finish my large flour mill at Brighton, which had cost me already about from 24 to 25,000 dollars… On my way home, instead of feeling happy and contented, I was very unhappy, and could not see that it would benefit me much, and I was perfectly right in thinking so… for about two weeks later the secret was out [and] my laborers began to leave me, in small parties first, but then all left, from the clerk to the cook, and I was in great distress."

"What a great misfortune was this sudden gold discovery for me! It has just broken up and ruined my hard, restless, and industrious labors...From my mill buildings I reaped no benefit whatever, the mill stones even have been stolen and sold."

"My tannery… was deserted, a large quantity of leather was left unfinished in the vats; and a great quantity of raw hides became valueless as they could not be sold; nobody wanted to be bothered with such trash, as it was called. So it was in all the other mechanical trades which I had carried on; all was abandoned, and work commenced or nearly finished was all left, to an immense loss for me."

Hutchings' California Magazine
November 1857

Man and woman heading for gold country


California's Gold Country
Rich Bar
Lassen's Ranch
Belden Bar
Nelson Point
Bidwell's Ranch
Indian Bar
Kanaka Flat
Downieville
Sierra City
Forbestown
Forest City
Long's Bar
Bidwell's Bar
Goodyear's Bar
Moore's Flat
Oroville
Camptonville
Relief Hill
North San Juan
French Corral
North Bloomfield
Nevada City
The Sutter Buttes
Dutch Flat
Sucker Flat
Grass Valley
You Bett
Yuba City
Marysville
Timbuctoo
Iowa Hill
Yankee Jim's
Rough and Ready
Maine Bar
Michigan Bluff
LAKE TAHOE
Auburn
Georgetown
Sutters Mill
Coloma
Spanish Flat
Placerville
Sutter's Fort
Mormon Island
Michigan Bar
Folsom
Fiddletown
Sacramento
Amador
Volcano
Sutter Creek
Jackson
Mokelumne Hill
Campo Seco
San Andreas
Murphys
Columbia
Angel's Camp
Sonora
Tuleburg (Stockton)
Jamestown
Jacksonville
Knights Ferry
Hawkins Bar
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San Francisco
San Jose
Monterey
PACIFIC OCEAN
LEGEND
Forts
Mining and Logging Camps
Towns
Forest and Mountains
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Miles

Clapp's Account of Gold Mining Life and Methods

Gold miners working on river

Excerpts 1 through 3

"This Bar is so small that it seems impossible that the tents and cabins scattered over it can amount to a dozen. There are, however, twenty in all, including those formed of calico shirts and pine boughs. With the exception of the paths leading to the different tenements, the entire level is covered with mining holes, on the edges of which lie the immense piles of dirt and stones which have been removed from the excavations."

—October 7, 1851

"For some weeks, with the exception of two or three families, everyone upon the river has been out of butter, onions, and potatoes. Ham, mackerel, and bread, with occasionally a treat of the precious butter, have been literally our only food for a long time. The rancheros have not driven in any beef for several weeks…the cold on the mountains still continues so intense that the trail remained impassable to mules."

—February 27, 1852

"Sometimes I lounge to the window and try to take a bird's-eye view of outdoors. A large pile of gravel prevents my seeing anything else, but by dint of standing on tiptoe I catch sight of a hundred other large piles of gravel...The whole Bar is thickly peppered with empty bottles, oyster-cans, sardine-boxes, and brandied-fruit jars. The river, freed from its wooden-flume prison, rolls gracefully by."

—November 21, 1852

Excerpts 4 and 5

"At every step gold-diggers, or their operations, greet your vision, sometimes in the form of a dam, sometimes in that of a river turned slightly from its channel to aid the indefatigable gold hunters in their mining projects. Now, on the side of a hill, you will see a long tom, a huge machine invented to facilitate the separation of the ore from its native element; or a man busily engaged in working a rocker, a much smaller and simpler machine used for the same object; or, more primitive still, some solitary prospector with a pan of dirt in his hands, which he is carefully washing at the water's edge to see if he can 'get the color.'"

—October 7, 1851

"In many places the surface soil, or 'top dirt,' 'pays' when worked in a 'Long Tom.' As to the rockers, so often mentioned in story and in song, I have not spoken of them since I commenced this letter. The truth is, that I have seldom seen them used, though hundreds are lying ownerless along the banks of the river. I suppose that other machines are better adapted to mining operations in the mountains."

—April 10, 1852

Source: *The Shirley Letters: From the California Mines, 1851–52.*

Flume diverting Tuolumne River

Flume and water wheels provide power

Piece 1

It took hundreds of workers to operate the new gold mines.

One of the new mining methods was hydraulic mining, which would often begin high up in the mountains. First, miners built giant flumes at a point in a river where the water moved very fast. These flumes stretched across canyons, along cliffs, and down steep mountainsides. The fast water from a river would travel in the flumes for many miles. It would end up at the place where other miners were waiting. There, the water was directed into a pipe with a huge hose on the end. It took all the strength they had for the miners to point the hoses in the right direction.

Piece 2

The water in the hose built up behind a nozzle called the "monitor." When the monitor was opened, the water exploded from it. The force of the water could rip through clay, rocks, and gravel. It was strong enough to blast away an entire mountainside. And that is just what the miners did.

After blasting the mountainside, many miners shoveled the water and dirt from the hillsides down into giant sluices (ditches dug by the miners that were sometimes lined with wood). Miners stood next to the sluices and collected the gold flakes and nuggets that they saw. The rest of the dirt and the water went down through the sluice and back into the river, making huge piles of dirt and rock called "tailings." This dirt and rock washed down the river, burying plants and animals and sometimes flooding homes and farms.

Piece 3

The hoses used in hydraulic mining were difficult to control and shut off. Sometimes, miners held these hoses 24 hours a day. Other miners shoveled dirt and water or stood next to the sluices all day and all night. Soil, rock, and dirt flowed downstream without stopping. Sometimes miners built campfires to help them work and stay warm during the night.

To keep the fires burning, miners cut down trees in the surrounding forests. They also cut trees to build the giant flumes and sluices, and to make houses for the hundreds of miners to sleep in when they were on a break.

Piece 4

Mercury is also called “quicksilver” because of its color and the way it moves. (At room temperature it is a liquid.) Mercury was used in gold mining because it joins to the gold and helps separate it from the soil.

The miners used mercury in their giant sluices. They covered the bottom and sides of the sluices with a paste made from mercury. As the water and dirt passed through the sluice, the mercury would grab onto tiny grains of gold (if there were any) in the muddy water. Later, the miners would scrape the sides of the sluice and heat up the paste. The mercury burned away, leaving all the gold behind.

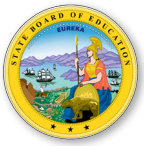
The “tailings” had mercury in them that washed into rivers and lakes downstream.

Piece 5

When mercury gets into water, much of it sinks to the bottom. Small animals eat it, or plants take it up through their roots.

Mercury gets into the food chain easily and never leaves. As one living thing eats another, the mercury passes from living thing to living thing. The amount of mercury builds up in top predators. Since humans are at the top of the food chain, they can end up having a lot of mercury in their bodies over time.

Mercury damages the nervous system in animals. When a person has mercury poisoning, they lose their balance, have trouble seeing, and may find it hard to hear or to talk.



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